Directorate of Intelligence

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The Soviet Chemical Weapons Program: Observations and Implications From the Tour of Shikhany

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An Intelligence Assessment

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SW 87-10055
December 1987

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The Soviet Chemical Weapons Program: Observations and Implications From the Tour of Shikhany [redacted] 25X1

An Intelligence Assessment

This paper was prepared by [redacted] 25X1
[redacted] Office of Scientific and Weapons 25X1
Research. Comments and queries are welcome and may be directed to the Chief, Science and Technology Division, OSWR, [redacted] 25X1

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The Soviet Chemical Weapons Program: Observations and Implications From the Tour of Shikhany

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Key Judgments

Information available as of 23 November 1987 was used in this report.

The October 1987 tour of the Shikhany chemical weapons facility was a carefully orchestrated propaganda event, but it was one step by the Soviets toward greater openness about their chemical weapons program. The visit has implications for the chemical weapons negotiations in that it projects an image of Soviet reasonableness in the talks that puts political pressure on the United States to sign a treaty.

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Although the Soviets stated that all types of chemical weapons and agents in their stockpile had been revealed, we believe that their exhibits were neither totally accurate nor complete. What appeared to be a display of 1950s munitions prompted Western delegates to ask whether all munitions—old and new—had been displayed. Soviet responses to this and several other questions were either evasive or inconsistent,

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recent painting of munitions have led us to believe that those displays contained specially altered materiel.

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Because the Soviets allowed unlimited photography of chemical munitions and technical presentations, our data base on their chemical weapons—which was incomplete—has increased. Much of the chemical weapons–related equipment displayed had not been seen before or had not been photographed from such close range. The munitions display provided us with detailed—and previously unavailable—characteristics of these weapons, such as fill weights and construction. The participation in a public event of three senior chemical troops generals—

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—was not only unprecedented but also enhanced our knowledge of the Soviets' chemical weapons program leadership. The Soviets also revealed one chemical warfare agent—thickened VX—that we not only had not known was in their inventory but also were surprised that they had thickened this highly persistent agent.

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We believe that a key Soviet goal in conducting this visit was to garner valuable publicity that would allow the Soviets to appear as prime movers toward a chemical warfare (CW) treaty. To accomplish this, the Soviets went to great lengths to ensure that the event was well publicized—both in the foreign and domestic media. Another key Soviet goal continues to be that of halting the US binary chemical weapons modernization program. On several occasions during the press conferences associated with the visit,

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Soviet officials stated—in front of an audience from 45 countries—that they believed this planned modernization of US capability was a detriment to the CW treaty negotiations. 25X1

It is most likely that only a few Western delegations had enough background information on the Soviet chemical warfare program to differentiate fact from propaganda. Comments from several delegations—especially the neutral and nonaligned—indicated that they believed the Soviets had displayed all their chemical weapons and technology, and therefore had shown incredible openness. 25X1

The Soviets' strict control of visitor access during the Shikhany visit strongly indicates that, on any similar future visits, visitors will only see what their hosts want them to. Visitors were steered away from areas to be their most sensitive ones. In addition, the Soviets spread fresh dirt around demonstration sites, suggesting that meaningful physical samples for intelligence analysis may be difficult to obtain. 25X1 25X1

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Introduction

On 3 and 4 October 1987, the USSR hosted a visit to the Shikhany chemical warfare facility. Shikhany—located approximately 800 kilometers southeast of Moscow—is the USSR's largest chemical weapons facility. It is involved in chemical weapons research and development (R&D), production, storage, testing, and training. The purported purpose of the event was to show Soviet openness and support for the arms control negotiations for banning chemical weapons, which is now in progress at the Conference on Disarmament in Geneva.

A total of 110 foreign representatives—from the 40 member nations of the Conference on Disarmament and five observer nations—participated in the visit. The invitation was first extended in August 1987 by Soviet Foreign Minister Shevardnadze at the Conference on Disarmament.

The 30 photographs contained in this report (figures 3 through 24) were taken during the tour. Photographs of some of the equipment in the field test areas provide far greater detail Until the evening before the Shikhany tour started, however, Soviet officials indicated that no photography of any type would be allowed. Consequently, some observers were unprepared when the Soviets indicated that photographs would be allowed.

The photographs in figures 3 through 11 show the chemical warfare (CW) munitions with display boards describing their characteristics. Although the Soviets asserted that these were the most modern CW weapons in their inventory, they appeared to be 1950s technology. The photographs in figures 12 through 15 are of Soviet officials who participated in the tour. The photographs in figures 16 through 23 show the Soviets' mobile chemical weapons destruction system. The photographs in figure 24 show buildings in a sensitive area of the chemical weapons complex.

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Munitions and destruction technology displays, as well as a live demonstration of destruction technology, were held in a demonstration area specially constructed for the occasion (see figure 1).

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The site, shown in figure 2, is approximately 6 kilometers southwest of the operational support complex of Shikhany—where the initial briefing was held. Also shown in figure 2 is the route of the foreign delegates during the visit.

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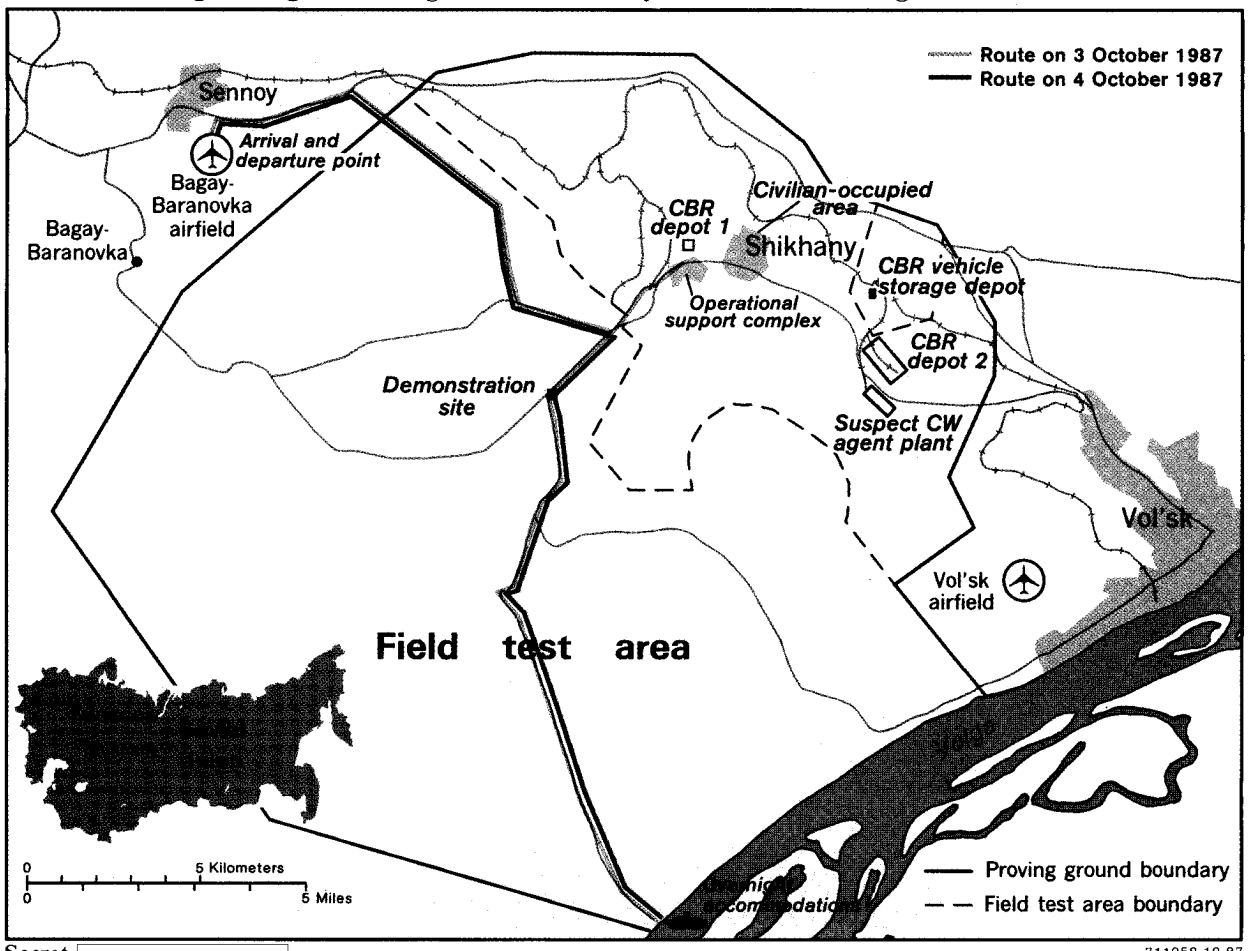
Figure 2
Routes of Foreign Delegates During Visit to Shikhany Central CW Proving Ground



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Soviet CW Munitions: New Information—Old Technology

The Soviets displayed 19 standard Soviet chemical munitions. In addition, they provided detailed physical-chemical characteristics of their seven standard chemical weapons agents. The appendix summarizes the munitions exhibited at Shikhany.

The display of and briefings on Soviet CW munitions and agents supported our assessment that the Soviets have a wide variety of munitions available to deliver chemical agents, and provided us with detailed characteristics of these weapons. In addition, foreigners were allowed to inspect these munitions at close range and take hundreds of photographs of them.

Even though the presentations by the Soviets probably were neither totally accurate nor complete, our understanding of their chemical weapons program (which had been incomplete, at best) improved as a result of this visit.

most of the seven standard chemical weapons agents presented at Shikhany were in the Soviet inventory. However, virtually all Western observers were surprised by the inclusion of thickened VX as a stockpiled agent—we had no previous indications that Western troops might even encounter such an agent on the battlefield.

Several characteristics of the 19 standard Soviet chemical munitions indicated that they had been specially prepared for this event and were not actual stockpiled munitions. All of the munitions were freshly painted,

These munitions were also marked in a manner strikingly similar to US chemical munitions. The 19 weapons—with one exception—had a gray base color with two circumferential green rings.

The standard munitions at Shikhany all used Western-style agent designators;

the Soviets use designators that are different from those used in the West for chemical warfare agents. The only time a Soviet designator was mentioned at Shikhany was as part of a foreign official's question. The official inquired why the agent VR-55—which we believe to be the Soviet designator for thickened Soman—had not been mentioned. This question was ignored by the Soviets.

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Lots of Questions: Evasive Answers—Nonresponses

When the Soviets were asked on several occasions if all types of chemical weapons—old and new—had been displayed, their responses were not consistent. What appeared to be a 1950s technology munitions display in particular prompted a number of questions by Western observers. Lieutenant General Kuntsevich, Deputy Chief of the Chemical Troops, stated that all types of chemical weapons possessed by the USSR had been displayed. He added that modernized versions of some of these weapons might exist, but that only relatively minor aspects of any weapon would have changed. In response to the same question, another Soviet official stated privately to the US delegation that he had received clarification from the Ministry of Defense that all munitions displayed at Shikhany were of the latest design; he added that multiple fills might be available for each munition. These responses raise more questions and may indicate confusion within the Soviet hierarchy about what could be revealed to foreigners.

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We believe that the Soviets have stockpiled more than the seven standard chemical weapons agents announced at Shikhany. When asked why cyanide agents were not revealed, General Kuntsevich admitted that the Soviets had developed cyanide weapons in the 1920s and 1930s. He also stated that these weapons had been destroyed many years ago and therefore had not been announced.

Another questioner asked if the nerve agent Tabun—also not on the list of stockpiled agents—had ever

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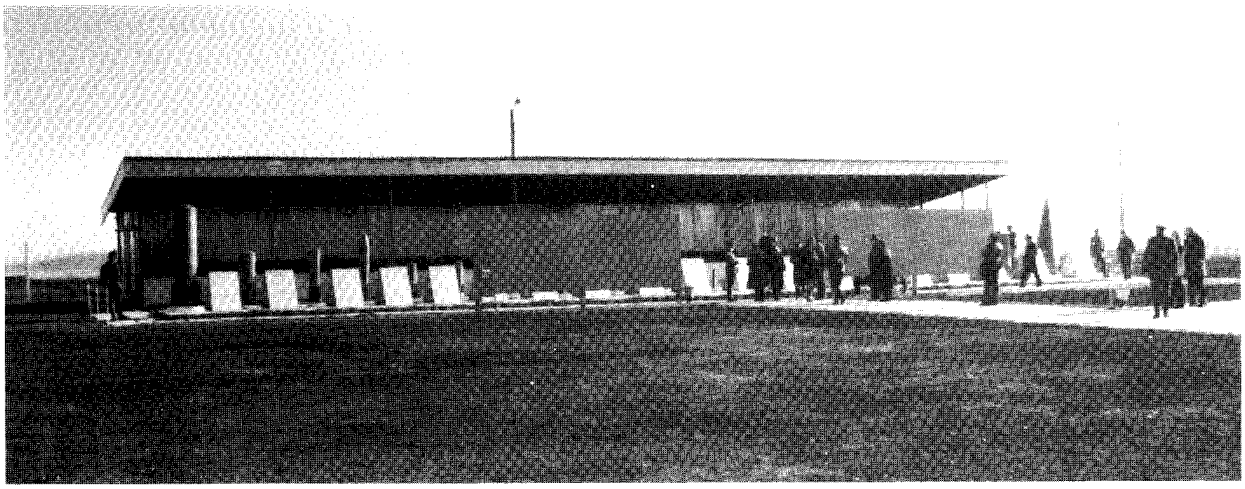

Figure 3. *Nineteen standard Soviet CW munitions, with descriptive display boards, that the Soviets say are maintained in their CW stockpile*

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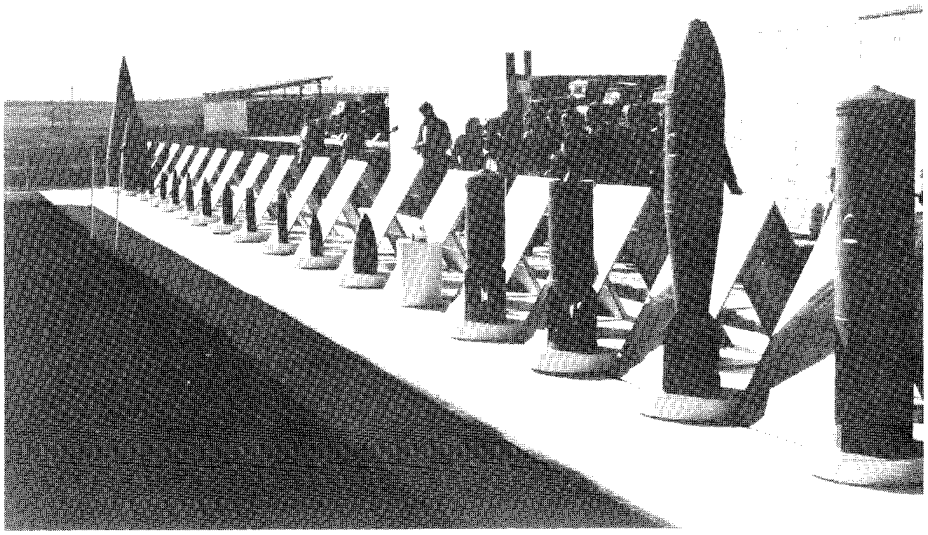
Figure 4. *A closer look at most of the CW weapons. The adjacent display board describes the characteristics of each munition; the larger boards in the rear describe the physical and chemical properties of the seven standard Soviet chemical agents.*



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been produced in the USSR. General Kuntsevich stated that Tabun had never been produced in the USSR.

Also contributing to our belief that the Soviets did not display all types of chemical weapons present in their inventory, is the Soviet Air Force and Naval Air Force have spray tanks for aerial offensive operations. Other additional evidence suggests that CW landmines are present in the Soviet arsenal. Further, chemical warheads probably exist for tactical missiles other than just the Frog and Scud warheads displayed (the Soviets only admitted having two missile warheads in their inventory). 25X1

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the Soviets reasserted at Shikhany that chemical weapons had never been in the non-Soviet Warsaw Pact countries (NSWP). (General Secretary Gorbachev first announced in April 1987 that NSWP countries had never had chemical weapons on their territory.) In addition, we currently assess that Romania and Czechoslovakia have programs for indigenous production of chemical weapons agents. 25X1

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other NSWP countries have been involved in various aspects of CW R&D and limited production 25X1

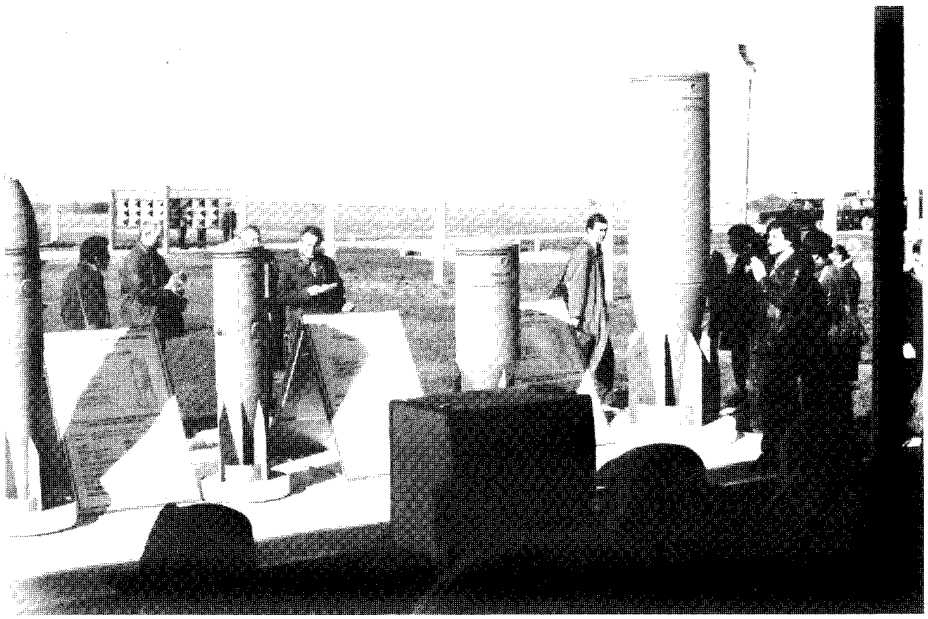

Figure 5. Aerial bombs and spray tanks and examples of the accompanying display boards describing the characteristics of those munitions. What appears to be 1950s technology can be seen by the blunt nose of the munitions—munitions designed for current use would be more aerodynamic.

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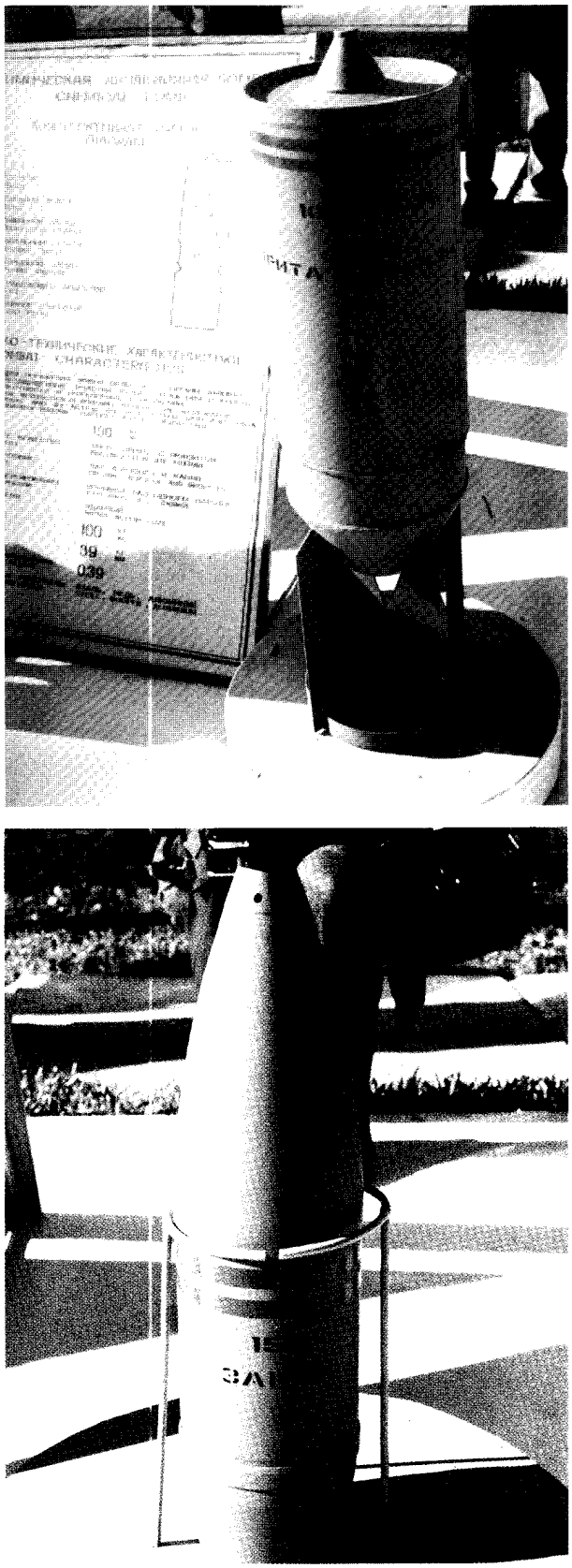

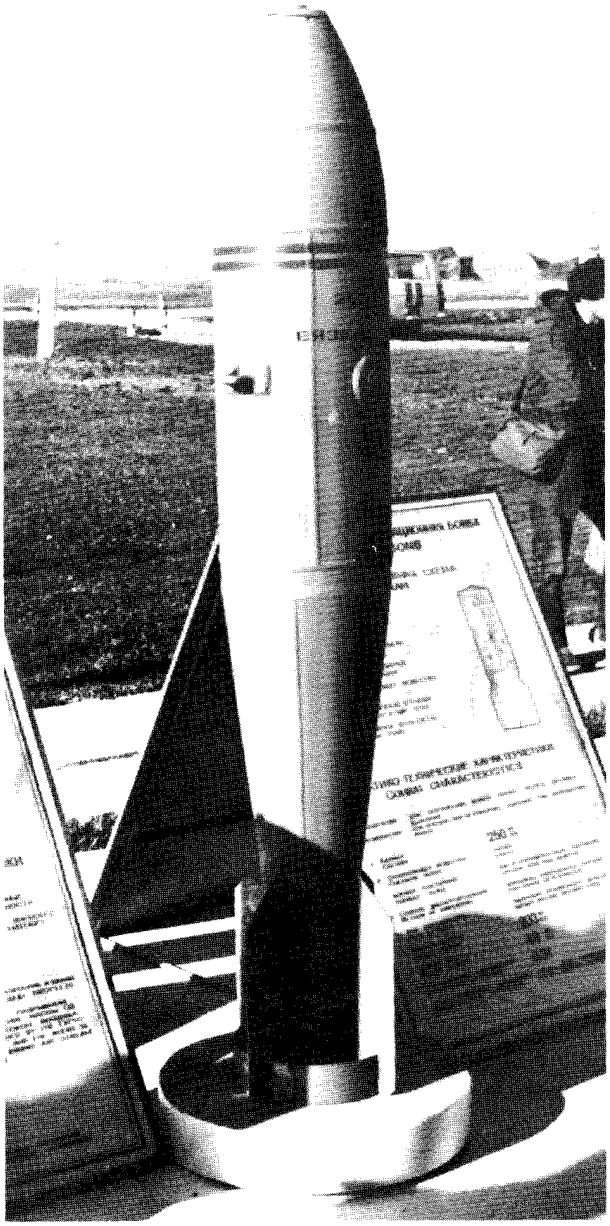

Figure 6. *Typical of all the displayed munitions—as can be seen in these closeups of aerial bombs—the munitions were freshly painted*

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Figure 7. A US official standing next to what we believe to be a Scud warhead—again apparently older technology. Scud is one of the only two chemical warheads for tactical missiles that the Soviets acknowledge having. [redacted]

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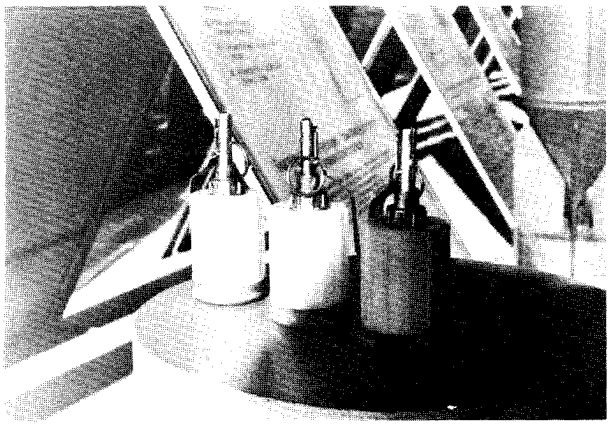

Figure 8. Chemical handgrenades, which contain riot control (tear gas type) agents. The Soviets want this type of equipment included in the treaty banning chemical weapons. These handgrenades, however, are typical in appearance to those used by police around the world for riot control. [redacted]

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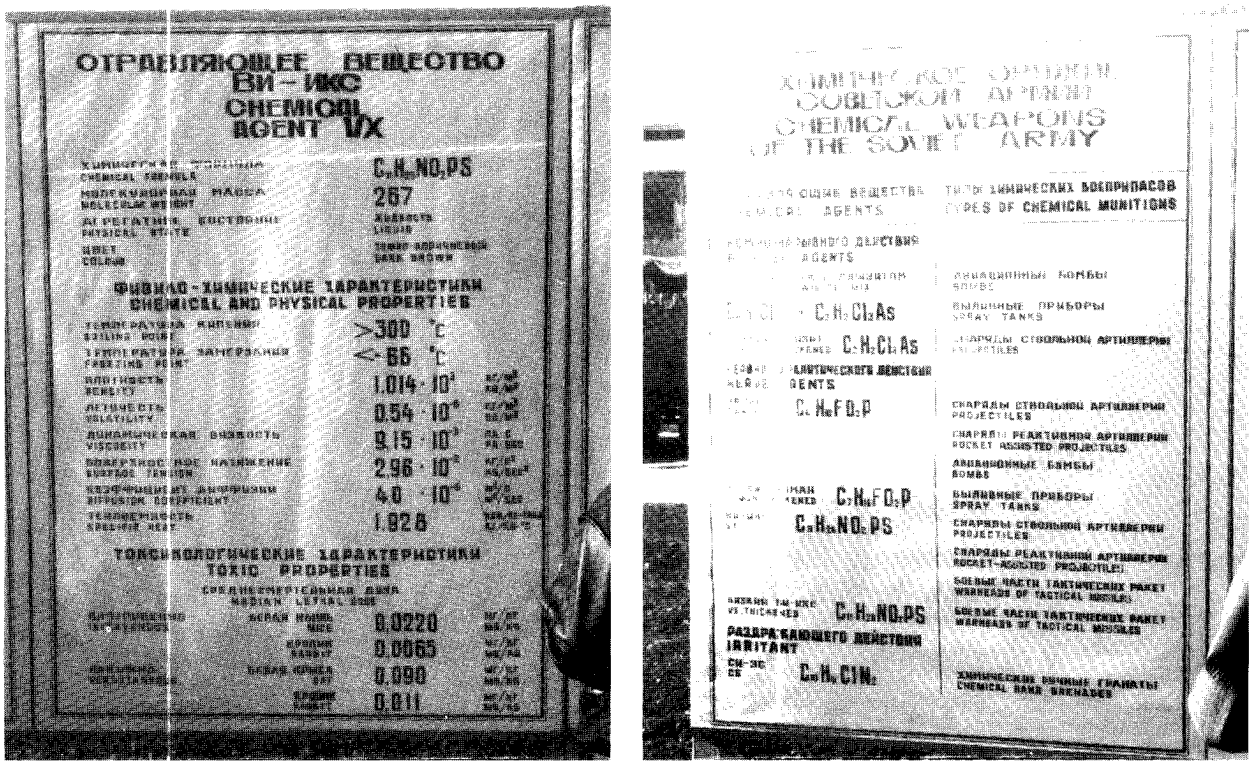

Figure 9. Display boards showing extensive amount of detail on chemical weapons agents and munitions in the Soviet arsenal.

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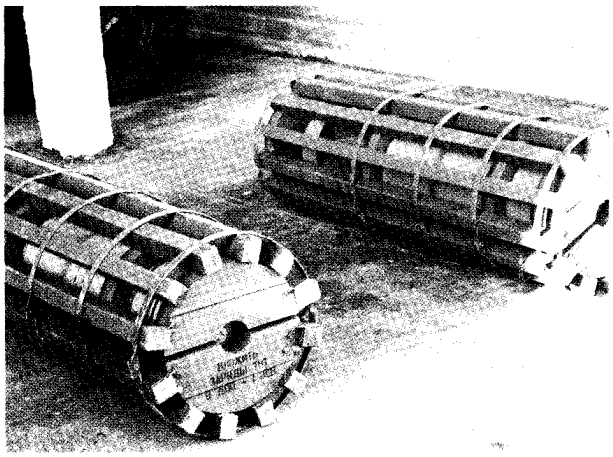

Figure 10. Shipping containers for Soviet CW weapons. The amount of detail shown in these and other photographs of the containers provides more information on the shipping containers than we have previously had.

Figure 11. The Soviet chemical mask—which appeared to be 1980s technology—supplied for visitors to wear and photograph; some were even partially disassembled by the visitors. The mask had not been seen by us before the tour; most visitors were favorably impressed by its technology.

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Soviet Chemical Weapons Leaders: To Us, New Faces/New Positions

A positive sign of Soviet openness was the participation of three high-level Chemical Troops officers in the visit: Colonel General Pikalov, Lt. Gen. Anatoliy Kuntsevich, and Maj. Gen. Robert Razuvanov. The positions of the latter two—Deputy Chief of the Chemical Troops and Commander of the Shikhany facility, [redacted] The appearance of these officers in public was an unprecedented event. [redacted]

Figure 12. General Pikalov, Chief of Soviet Chemical Troops. [redacted]

Figure 13. General Pikalov (left) and General Kuntsevich (right). General Kuntsevich is Deputy Chief of the Soviet Chemical Troops; [redacted]

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Figure 14. General Razuvanov (left), commander of Shikhany chemical weapons facility. He [redacted]

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Figure 15. In the center is Yuri Nazarkin, Soviet Ambassador (for chemical warfare matters) to the Conference on Disarmament. He is accompanied by (left) G. Berdennikov, a senior representative of the Soviet Ministry of Foreign Affairs, and (right) Captain Lisoff, an official of the Soviet Ministry of Defense. [redacted]

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Mobile Chemical Weapons Destruction System: Current Technology—Contrived Exhibits

Many of the vehicles in the mobile chemical weapons destruction system had either not been identified previously or not been photographed by Westerners from such close range. Observers also were allowed to enter some of the vehicles. (See inset for listing of the structure and characteristics of the mobile chemical weapons destruction system.)

As part of the display of chemical weapons destruction technology, the Soviets destroyed a 250-kilogram (kg) bomb, which they stated contained the lethal nerve agent Sarin. This took place inside the destruction-process building, where one or two observers from several delegations watched the process. The majority of the observers watched the exercise on closed-circuit TV monitors in the grandstand. However, several observations cause us to doubt that the munition contained live agent:

- A Soviet who handled a syringe of "nerve agent" from the bomb apparently had a hole in the thumb of his protective glove. It seems unlikely that someone handling a superlethal substance would make such an oversight, since any skin contact would result in immediate death.

- The Soviets allowed foreigners with beards to watch the destruction firsthand, wearing only standard gas masks (beards hinder proper sealing of gas masks). The nerve agent in the bomb was exposed directly to the atmosphere only 10 meters from these special observers, which could be lethal for them if the masks were not properly sealed.

- The Soviets allowed the more distant observers in the grandstand area to sit near the destruction point without wearing gas masks.

- The Soviets assigned a reconnaissance vehicle containing air-sampling equipment to patrol the surrounding area so that those observers who remained in the more distant grandstand and who were unmasked would not be at risk. However, the vehicle was upwind—not downwind—of the bomb disassembly point where escaped nerve agent most likely would be detected and where the delegates were seated.

We believe it unlikely that these errors would have been made if live agent had been involved, especially since the visitors' lives could have been at risk. We suspect that the bomb contained either a simulant or, less likely, a live but greatly diluted nerve agent

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Vehicles Comprising Mobile Chemical Weapons Destruction System

1 Transport vehicle (ZIL-131) with neutralization reactor
2 Transport vehicles (ZIL-131) with munition disassembly chambers
1 Mobile chemical lab (AL-4M)
2 ARS-14u filling vehicles
1 Agent incinerator (11 G 426)
1 Power generator (ESDA-200)
1 Compressor (UKS-400v)
1 Mobile bathing facility (DDA-66)
1 Transport vehicle (URAL-375D)
1 Reconnaissance vehicle (UAZ-469 RKH)
4 Prime movers (for incinerator, generator, lab, compressor)

Characteristics of Mobile System

Time of deployment	=	*10 hours*
Crew	=	*17 men*
Power	=	*131 kilowatts*
Facilities weight	=	*4.1 tons*
System general weight	=	*66.5 tons*

Can be moved by air, rail, sea.

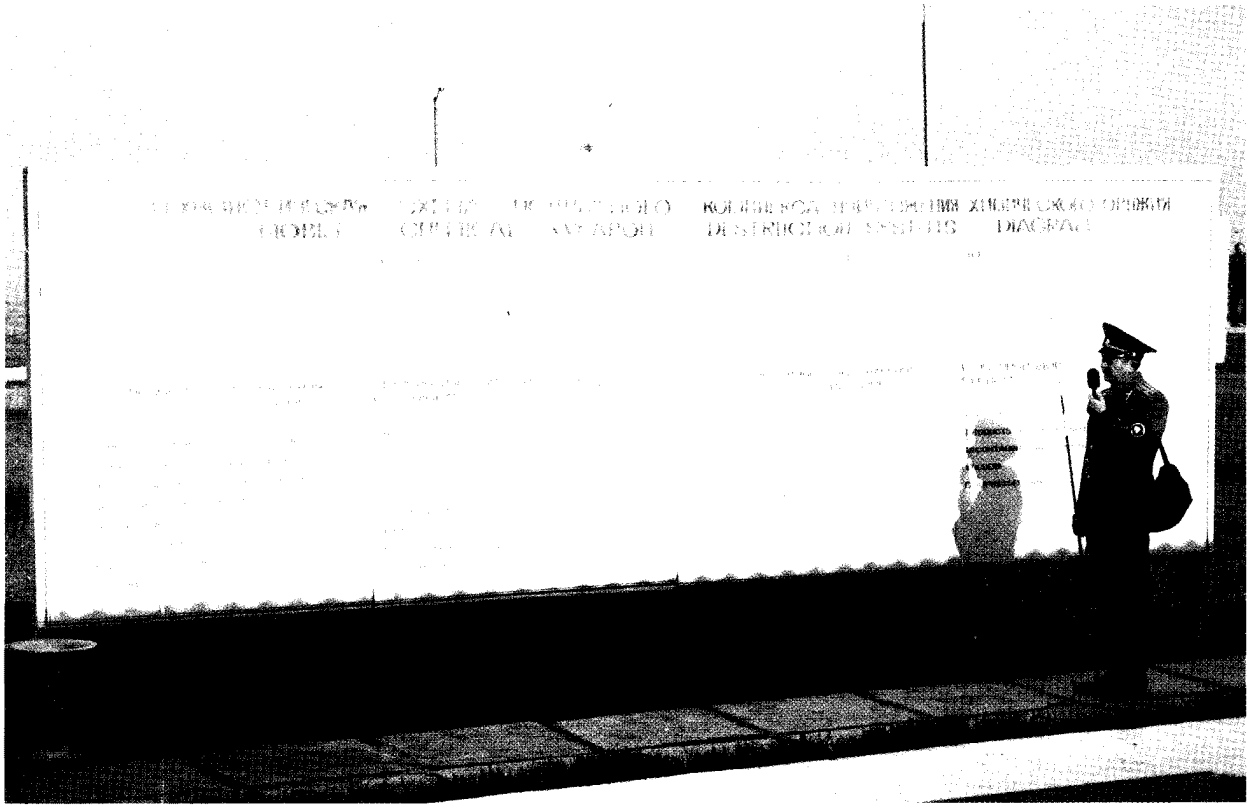

Figure 16. Soviet officer briefing visitors on how the mobile chemical weapons destruction system works. All display boards and presentation panels, such as this one, were printed in both Russian and English.

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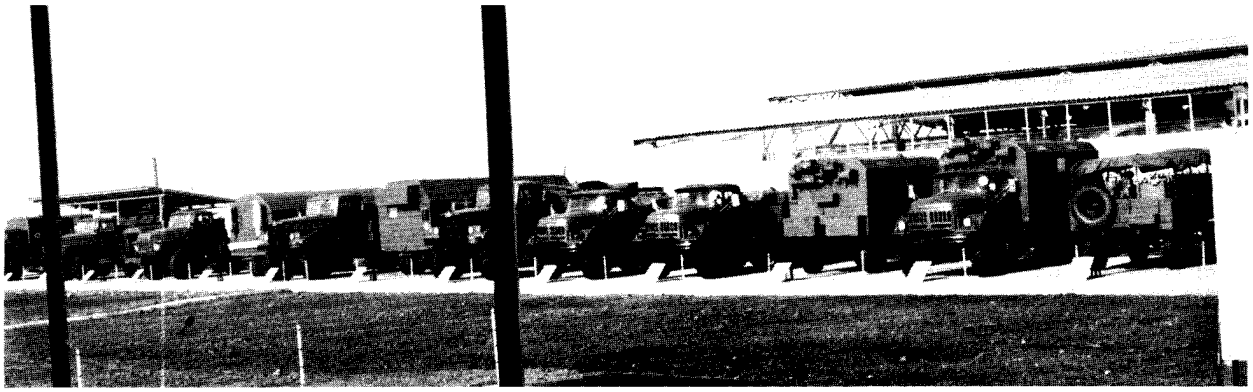

Figure 17. These vehicles—some of which had never been seen by us before the Shikhany tour—would typically be included as part of the mobile chemical weapons destruction system.

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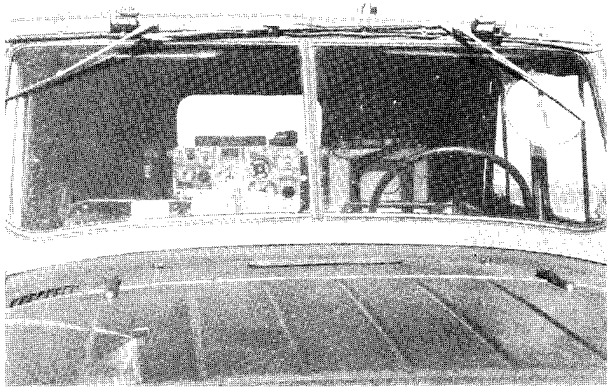

Figure 18. *Chemical reconnaissance vehicle, and its onboard chemical-agent detector equipment that appeared to be 1980s technology*

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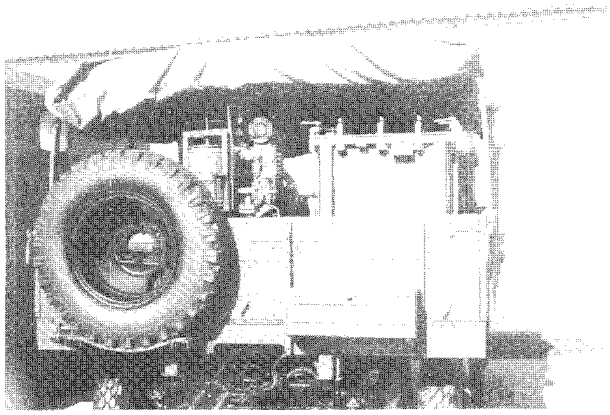

Figure 19. *Special CW munitions disassembly chambers on a transport vehicle.*

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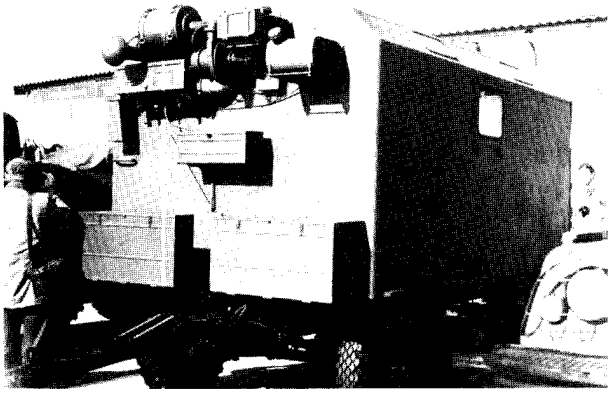

Figure 20. Exterior and interior of mobile chemical laboratory contained in a "trailer" pulled by a "prime mover."

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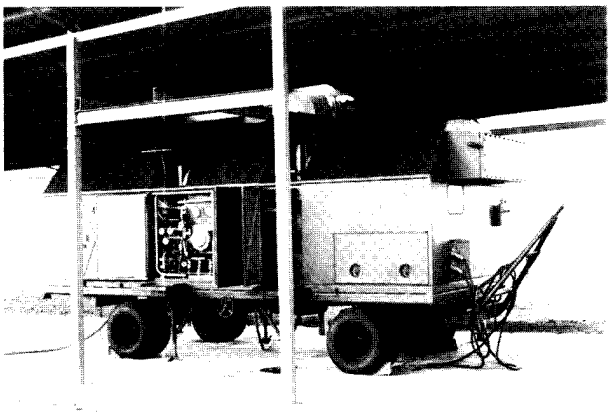

Figure 21. Mobile chemical agent incinerator used for destroying the agent drained from a CW munition.

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Figure 22. Soviet soldiers in full chemical protective suits typical of those worn during the "live" demonstration.

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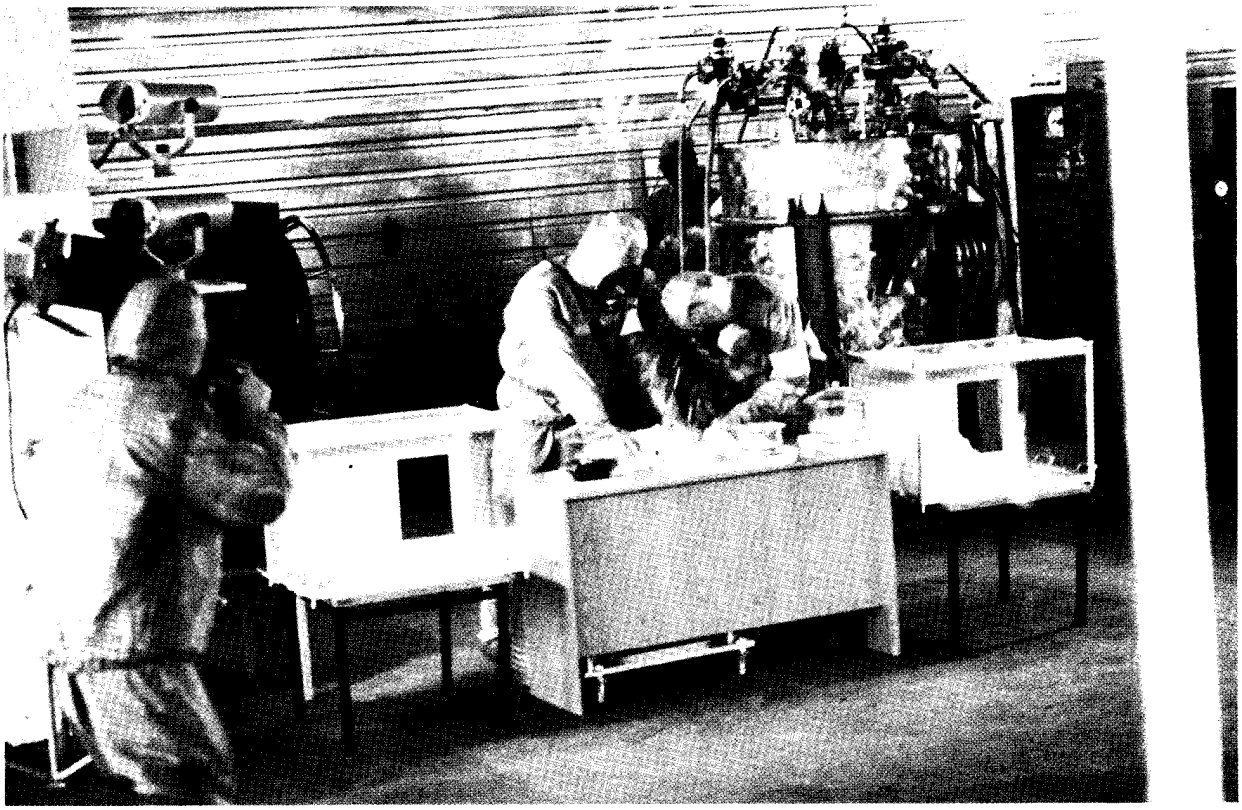

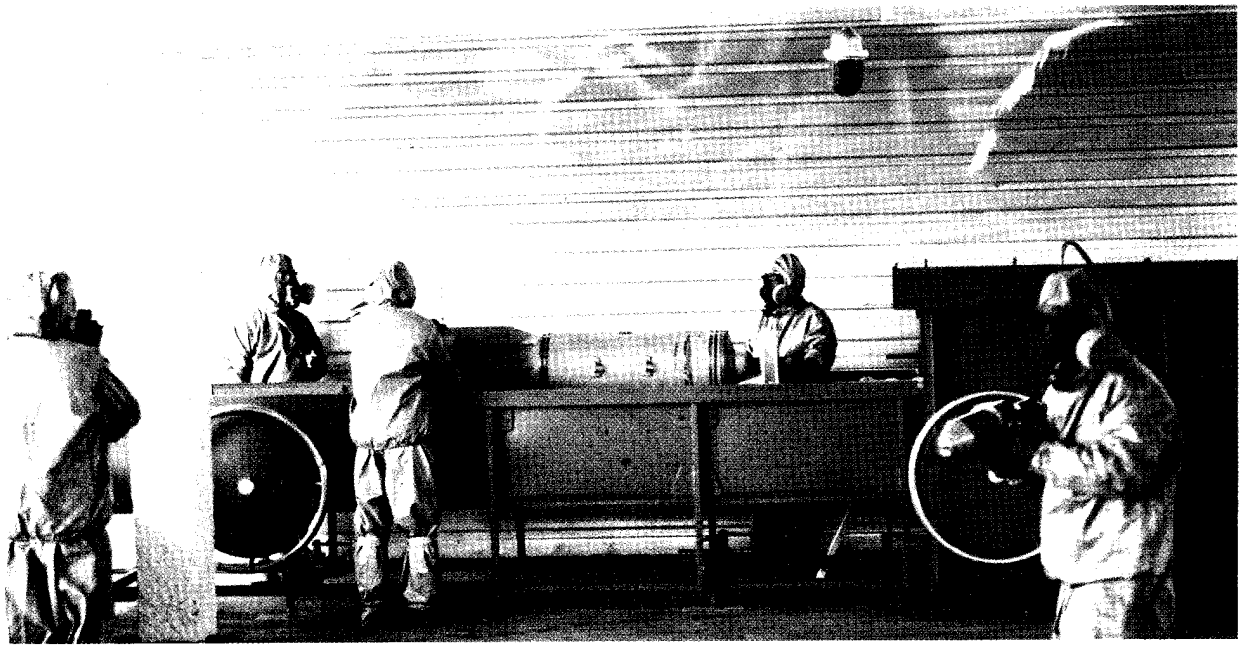

Figure 23. "Live" destruction of a chemical bomb containing a nerve agent—a rabbit being injected with the nerve agent (to prove the agent's lethality) and the mobile chemical weapons destruction system preparation area (left and center) and munition disassembly chamber (right).

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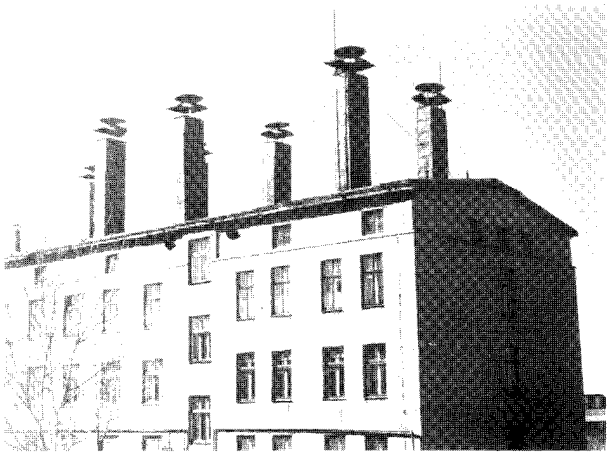

Figure 24. Buildings in the sensitive area of Shikhany in which we believe R&D on chemical weapons agents is conducted. We were not accorded entry into any of these buildings.

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Controlled Visitor Access: Keep the Blinders On

To ensure that visitors saw only what the Soviets wanted them to see, the Soviets routed the tour primarily on recently improved backroads. (Without the improvements, backroads would not have been suitable for the tour.) Visitors therefore could be shown only a small part of the Shikhany facility and could be steered away from the most sensitive areas, such as storage and agent production facilities. In addition, visitors were accommodated overnight on a cruise ship on the adjacent Volga River—another excellent way to control visitor access.

Other than the demonstration area, the only building into which foreign delegates were taken was the auditorium in the Shikhany Club where the initial briefing was held.

During a quick tour through part of the sensitive operational support complex, the observers were driven past buildings that we believe have been involved in research and development of chemical agents. Several photos were taken and have provided us with a more detailed look at the structures. Although this is a sensitive area (evidenced by the high security), a much more in-depth exposure—including a visit inside buildings—would normally be required to obtain data of significant intelligence value. At one point, however, a US observer was able to get a brief glimpse inside one of these buildings as the delegation drove by; inside was what appeared to be a chemical pilot plant.

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In addition, the Soviets had apparently spread fresh dirt around demonstration sites at Shikhany shortly before visitor arrival; this was an effective measure to ensure that any soil samples taken would not yield valuable data on activities at the site.

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Finally, the Soviets made extensive use of camouflage netting to conceal a variety of equipment that was within the foreign delegates' sight.

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Soviet Goals: Publicity—Halt US Binary CW Program

We believe that a key Soviet goal in conducting this visit was to garner valuable publicity that would allow the Soviets to appear as prime movers toward a CW treaty. The Soviets went to great lengths to ensure that this event was well publicized—both in the foreign and domestic media. The event was prominently featured on the television news in Moscow and in the main Soviet newspapers. To ensure significant media coverage, the Soviets allowed 55 press and TV representatives to cover the event, including at least 15 foreign journalists.

Another key Soviet goal apparently continues to be that of halting the US binary chemical weapons modernization program. On several occasions during the press conferences associated with the visit, Soviet officials stated—in front of an audience from 45 countries—that they believed this planned modernization of US capability was a detriment to the CW treaty negotiations. During the final press conference in Moscow, US Ambassador Friedersdorf was given the floor, but was abruptly silenced when he started to elaborate on why the modest chemical weapons modernization program envisioned by the United States is not inconsistent with the treaty process. Afterward, several members of other delegations said they were shocked at the Soviets' stark refusal to allow a more balanced exchange.

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Foreign Reactions: Skepticism—Political Coup for the USSR

At a meeting shortly after the visit, Western ambassadors to the Conference on Disarmament presented their views on the event. French Ambassador Morel and UK Ambassador Solesby said that the equipment and munitions appeared to date from the 1950s and 1960s and expressed doubt about Soviet claims that no subsequent technological developments had taken place. Ambassador Solesby was also concerned about "misleading and evasive" answers given to several questions—especially those regarding the status of more toxic munitions and toxic agents. [redacted] 25X1

Almost all Western ambassadors stated that the event had been a major political coup for the USSR. The UK Ambassador termed the visit "a partial lifting of the veil of secrecy," and France called it a "political move of real importance." Although most of the ambassadors were cautious about the substantive importance of the event, they indicated this was a highly significant political step. [redacted] 25X1

Future Visits: The Implications—The Potential Value

As to future visits to Soviet chemical weapons facilities, the Soviets have already announced that CD member nations will be invited to tour the special large-scale chemical weapons destruction facility at Chapayevsk once it is complete, probably during 1988. In addition, the Soviets recently have stated that the United States will be invited back to the Shikhany facility for a follow-on visit. In exchange, the Soviets have expressed interest in touring the US's Dugway chemical weapons testing ground. The Soviets and the United Kingdom have also decided to exchange visits—a follow-on visit back to Shikhany for the British and a Soviet visit to the British Chemical Defense Establishment at Porton Down. In addition, on 16 and 17 November 1987, a Soviet delegation visited the West German chemical weapons destruction facilities at Munster.

The strict control of access at Shikhany is a strong indication that, on future visits to Soviet chemical weapons–related facilities, foreign visitors will only see exactly what their hosts want them to; this is not surprising. Also, with the Soviets, having spread fresh dirt around demonstration sites before this tour, the possibility of obtaining meaningful physical samples on future visits would appear to be nonexistent.

The Shikhany visit also suggests that foreign visitor persistence sometimes can pay off when Soviets restrict activities. For example, only after assertions by several Western delegations that the Shikhany visit would hold less significance if photography was not allowed did the Soviets allow photographs to be taken. Although we cannot be sure this was the only cause of the Soviet reversal, Western persistence appeared to be at least a contributing factor. 25X1

Although it is difficult to project what of intelligence value may be learned on future trips, the following observations at Shikhany give some indications:

- A great deal will hinge on whether visits inside buildings will be part of future exhibits. Although the Soviets drove visitors past some R&D facilities in the operational support area of Shikhany, little could be learned without viewing the interiors.

- The Soviets also constructed the special demonstration facility in a remote part of Shikhany, and most of the visitors' time was spent in this area. The use of this remote area kept visitors isolated from the most sensitive parts of the facility. 25X1

- A key factor will also be whether future Soviet exhibits are directly relevant to the CW treaty. Much of the equipment and data displayed had only limited relevance to the treaty under negotiation. For example, the small-scale mobile destruction system at Shikhany would be totally inappropriate for destroying a stockpile of large numbers of weapons. The special large-scale destruction plant the Soviets are now building at Chapayevsk will reportedly use sophisticated remote-controlled equipment, whereas the Shikhany system was essentially a manually controlled system. 25X1 25X1

Appendix

Chemical Munitions Displayed at Shikhany

Type of Weapon	Caliber or Mass	Components	Agent	Dispersed Agent	Effects	Dissemination	Fuze	Total Weight *(kg)*	Agent Weight *(kg)*
Tactical missile	884 mm	Body/agent/ filling plug/ explosive charge	VX (thickened)	Coarse aerosol and droplets	. . . [a]	Warhead opened by explosive charge and agent disseminated by running airstream	Radio	985	555
Tactical missile	540 mm	Body/agent/ filling plug/ explosive charge	VX	Coarse aerosol and droplets	. . . [a]	Warhead opened by explosive charge and agent disseminated by running airstream	Radio	436	216
Artillery	122 mm	Projectile body/explosive well/explosive charge (TNT) agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	22.2	1.3
Artillery	122 mm	Projectile body/explosive well/explosive charge (TNT) agent/fuze/ filling plug	Lewisite (thickened)	Vapor, aerosol, and droplets	. . . [a]	Explosive charge	Time	23.1	3.3
Artillery	130-mm shell	Projectile body/explosive well/explosive charge (TNT) agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	33.4	1.6
Artillery	130-mm shell	Projectile body/explosive well/explosive charge (TNT) agent/fuze/ filling plug	VX	Coarse aerosol and droplets	. . . [a]	Explosive charge	Proximity	33.4	1.4
Artillery	152 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	40	2.8

Footnote appears at end of table.

Chemical Munitions Displayed at Shikhany (continued)

Type of Weapon	Caliber or Mass	Components	Agent	Dispersed Agent	Effects	Dissemination	Fuze	Total Weight *(kg)*	Agent Weight *(kg)*
Artillery	152 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	Lewisite (thickened)	Vapor, aerosol, and droplets	. . . [a]	Explosive charge	Time	42.5	5.4
Rocket artillery	122 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	19.3	3.1
Rocket artillery	122 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	VX	Coarse aerosol and droplets	. . . [a]	Explosive charge	Proximity	19.3	2.9
Rocket artillery	140 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	18.3	2.2
Rocket artillery	240 mm	Projectile body/explosive well/explosive charge (TNT)/ agent/fuze/ filling plug	GB	Vapor and fine aerosol	. . . [b]	Explosive charge	Impact	44.3	8.0
Chemical handgrenade	NA	Body/outlet hole/pyrotechnic mixture with agent/ignition device	CS	Vapor and thin aerosol	. . . [c]	Vaporization from pyrotechnic mixture		0.25	0.17
Aerial bomb	100 kg	Body/explosive well/explosive charge/agent filling plug	Mustard/ Lewisite mixture	Vapor, aerosol, and droplets	. . . [a]	Explosive charge	Impact	80	28
Aerial bomb	100 kg	Body/case/ propelling charge/explosive well/explosive charge/agent/ filling plug	Mustard/ Lewisite mixture	Vapor, aerosol, and droplets	. . . [a]	Fuze	Impact	100	39
Aerial bomb	250 kg	Body/explosive well/explosive charge/agent/ filling plug	Soman (thickened)	Coarse aerosol and droplets	. . . [a]	Bomb opened by explosive charge and agent disseminated by running airstream	Time	130	45

Footnote appears at end of table.

Chemical Munitions Displayed at Shikhany (continued)

Type of Weapon	Caliber or Mass	Components	Agent	Dispersed Agent	Effects	Dissemination	Fuze	Total Weight *(kg)*	Agent Weight *(kg)*
Aerial bomb	250 kg	Body/explosive well/explosive charge/agent/ fragmentation well/filling plug	GB	Vapor and thin aerosol	. . . [b]	Explosive charge	Impact	233	49
"Chemical spray tank" (bomb)	500 kg	Body/explosive charge/filling plug/agent	Mustard/ Lewisite mixture	Vapor, aerosol, and droplets	. . . [a]	"Tank" opened by explosive charge and agent disseminated by running airstream	Time	280	164
"Chemical spray tank" (bomb)	1,500 kg	Body/explosive charge/filling plug/agent	Mustard/ Lewisite mixture	Vapor, aerosol, and droplets	. . . [a]	"Tank" opened by explosive charge and agent disseminated by running airstream	Time	963	630

[a] Destruction of personnel and contamination of terrain, materiel, and fortifications.
[b] Destruction of personnel through respiratory route.
[c] Incapacitation of personnel.

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